Interview Summary	Application No.	Applicant(s)	
	10/019,331	SAMAIN ET AL.	
	Examiner	Art Unit	
	JYOTHSNA A. VENKAT Ph. D	1615	

All participants (applicant, applicant's representative, PTO personnel):

(1) *JYOTHSNA A. VENKAT Ph. D.*

(2) *Thalia Warnement*.

(3) *Deborah M. Herzfeld*.

(4)_____.

Date of Interview: *27 June 2005*.

Type: a)☐ Telephonic b)☐ Video Conference
c)☒ Personal [copy given to: 1)☐ applicant 2)☒ applicant's representative]

Exhibit shown or demonstration conducted: d)☒ Yes e)☐ No.
If Yes, brief description: *Water-dispersible adhesive raw materials for non-woven assemblies(Publication date not known) by Richard A. Miller, Eastman chemical company*.

Claim(s) discussed: *as of record*.

Identification of prior art discussed: *as of record*.

Agreement with respect to the claims f)☐ was reached. g)☒ was not reached. h)☐ N/A.

Substance of Interview including description of the general nature of what was agreed to if an agreement was reached, or any other comments: *See Continuation Sheet*.

(A fuller description, if necessary, and a copy of the amendments which the examiner agreed would render the claims allowable, if available, must be attached. Also, where no copy of the amendments that would render the claims allowable is available, a summary thereof must be attached.)

THE FORMAL WRITTEN REPLY TO THE LAST OFFICE ACTION MUST INCLUDE THE SUBSTANCE OF THE INTERVIEW. (See MPEP Section 713.04). If a reply to the last Office action has already been filed, APPLICANT IS GIVEN ONE MONTH FROM THIS INTERVIEW DATE, OR THE MAILING DATE OF THIS INTERVIEW SUMMARY FORM, WHICHEVER IS LATER, TO FILE A STATEMENT OF THE SUBSTANCE OF THE INTERVIEW. See Summary of Record of Interview requirements on reverse side or on attached sheet.

Interview Record OK

6/28/05

JYOTHSNA VENKAT
PRIMARY EXAMINER
GROUP ~~1500~~ 1600

Examiner Note: You must sign this form unless it is an Attachment to a signed Office action.

Examiner's signature, if required

Summary of Record of Interview Requirements

Manual of Patent Examining Procedure (MPEP), Section 713.04, Substance of Interview Must be Made of Record
A complete written statement as to the substance of any face-to-face, video conference, or telephone interview with regard to an application must be made of record in the application whether or not an agreement with the examiner was reached at the interview.

Title 37 Code of Federal Regulations (CFR) § 1.133 Interviews
Paragraph (b)
In every instance where reconsideration is requested in view of an interview with an examiner, a complete written statement of the reasons presented at the interview as warranting favorable action must be filed by the applicant. An interview does not remove the necessity for reply to Office action as specified in §§ 1.111, 1.135. (35 U.S.C. 132)

37 CFR §1.2 Business to be transacted in writing.
All business with the Patent or Trademark Office should be transacted in writing. The personal attendance of applicants or their attorneys or agents at the Patent and Trademark Office is unnecessary. The action of the Patent and Trademark Office will be based exclusively on the written record in the Office. No attention will be paid to any alleged oral promise, stipulation, or understanding in relation to which there is disagreement or doubt.

The action of the Patent and Trademark Office cannot be based exclusively on the written record in the Office if that record is itself incomplete through the failure to record the substance of interviews.

It is the responsibility of the applicant or the attorney or agent to make the substance of an interview of record in the application file, unless the examiner indicates he or she will do so. It is the examiner's responsibility to see that such a record is made and to correct material inaccuracies which bear directly on the question of patentability.

Examiners must complete an Interview Summary Form for each interview held where a matter of substance has been discussed during the interview by checking the appropriate boxes and filling in the blanks. Discussions regarding only procedural matters, directed solely to restriction requirements for which interview recordation is otherwise provided for in Section 812.01 of the Manual of Patent Examining Procedure, or pointing out typographical errors or unreadable script in Office actions or the like, are excluded from the interview recordation procedures below. Where the substance of an interview is completely recorded in an Examiners Amendment, no separate Interview Summary Record is required.

The Interview Summary Form shall be given an appropriate Paper No., placed in the right hand portion of the file, and listed on the "Contents" section of the file wrapper. In a personal interview, a duplicate of the Form is given to the applicant (or attorney or agent) at the conclusion of the interview. In the case of a telephone or video-conference interview, the copy is mailed to the applicant's correspondence address either with or prior to the next official communication. If additional correspondence from the examiner is not likely before an allowance or if other circumstances dictate, the Form should be mailed promptly after the interview rather than with the next official communication.

The Form provides for recordation of the following information:
- Application Number (Series Code and Serial Number)
- Name of applicant
- Name of examiner
- Date of interview
- Type of interview (telephonic, video-conference, or personal)
- Name of participant(s) (applicant, attorney or agent, examiner, other PTO personnel, etc.)
- An indication whether or not an exhibit was shown or a demonstration conducted
- An identification of the specific prior art discussed
- An indication whether an agreement was reached and if so, a description of the general nature of the agreement (may be by attachment of a copy of amendments or claims agreed as being allowable). Note: Agreement as to allowability is tentative and does not restrict further action by the examiner to the contrary.
- The signature of the examiner who conducted the interview (if Form is not an attachment to a signed Office action)

It is desirable that the examiner orally remind the applicant of his or her obligation to record the substance of the interview of each case. It should be noted, however, that the Interview Summary Form will not normally be considered a complete and proper recordation of the interview unless it includes, or is supplemented by the applicant or the examiner to include, all of the applicable items required below concerning the substance of the interview.

A complete and proper recordation of the substance of any interview should include at least the following applicable items:
1) A brief description of the nature of any exhibit shown or any demonstration conducted,
2) an identification of the claims discussed,
3) an identification of the specific prior art discussed,
4) an identification of the principal proposed amendments of a substantive nature discussed, unless these are already described on the Interview Summary Form completed by the Examiner,
5) a brief identification of the general thrust of the principal arguments presented to the examiner,
   (The identification of arguments need not be lengthy or elaborate. A verbatim or highly detailed description of the arguments is not required. The identification of the arguments is sufficient if the general nature or thrust of the principal arguments made to the examiner can be understood in the context of the application file. Of course, the applicant may desire to emphasize and fully describe those arguments which he or she feels were or might be persuasive to the examiner.)
6) a general indication of any other pertinent matters discussed, and
7) if appropriate, the general results or outcome of the interview unless already described in the Interview Summary Form completed by the examiner.

Examiners are expected to carefully review the applicant's record of the substance of an interview. If the record is not complete and accurate, the examiner will give the applicant an extendable one month time period to correct the record.

Examiner to Check for Accuracy

If the claims are allowable for other reasons of record, the examiner should send a letter setting forth the examiner's version of the statement attributed to him or her. If the record is complete and accurate, the examiner should place the indication, "Interview Record OK" on the paper recording the substance of the interview along with the date and the examiner's initials.

Continuation of Substance of Interview including description of the general nature of what was agreed to if an agreement was reached, or any other comments: The attorney informed the examiner that they do not agree with the written description reejction and applicants are willing to limit the adhesive polymer to " branched sulfonic adhesive polymer" since the specification describes AQ 1350, which is a branched sulfonic adhesive polymer. The examiner informed the attorneys that description for one polymer does not support the genus, but suggested to incorporate viscosity since the brochure submitted teaches 4 branched polymers with different viscosities. The attorneys also informed the examiner that the branched polymer will overcome the 102 (b) rejection since the patent discloses linear polymers. The attorney's also informed the examiner that linear polymers are used for cosmetics(appendix D) submitted previously where as branched polymers are not used for cosmetics(page 1) of brochure. The examiner also informed the attorney's that the new matter rejection is maintained.

Richard A. Miller
Eastman Chemical Company

Abstract

Bonding with holt-melt adhesives poses some unique requirements to maintain bond integrity under a variety of end uses. The hot-melt adhesive industry has desired a water-dispersible raw material for a considerable amount of time. Previous attempts to satisfy this need were often deficient in both critical performance requirements and cost. Because regulatory changes are not driving this technology at present, adhesive manufacturers are reluctant to introduce products based on expensive raw materials. Thus, branched polyesters represents a "best of both worlds" compromise where water-dispersibility is provided, along with other unique attributes, without sacrificing the key application/performance profiles that the adhesive industry requires.

Eastman has developed branched water-dispersible polyester which, in addition to aqueous dispersions, may be used in the formulation of hot-melt adhesives for packaging, nonwovens, and other uses. Available in a range of viscosities (IVs), this material offers the following key features:

- 100% water-dispersible in ordinary tap water.
- Non-dispersible in ionic solutions
- Superior adhesion to Polyolefin films.
- Comparable key physical properties

Introduction

Hot-melt adhesives are useful for bonding various substrates such as wood, paper, plastics, nonwoven assemblies, textiles, and other materials. These applications call for high bond strength to resist shock, stress, high humidity, and extreme temperatures encountered in transportation and storage. In addition, the melt point, wetting time, initial tack, setting time, pot life, and general handling characteristics on automatic machinery are essential considerations. The hot melt industry has desired a water dispersible raw material for a considerable amount of time. In response to this need Eastman developed a family of water dispersible sulfopolyesters for use in hot melt and aqueous repulpable formulations. The properties and performance characteristics of these water dispersible polyesters will be described in this paper. Although these water dispersible raw materials were developed for use in packaging adhesives, the unique combination of properties renders these polymers suitable for non-woven applications.

Table 1

Physical Properties				
Production Status	Commercial	Commercial	Commercial	Commercial
Product Name	AQ 1045	AQ 1350	AQ 1950	AQ 14000
Brookfield Thermosel viscosity @ 177°C, cP (mPa·s)	3000-6000	28,000-45,000	80,000-110,000	300,000-500,000
Gardner colors (molten), max.	4	4	4	4
Physical form	Clear Solid	Clear Solid	Clear Solid	Clear Solid
Ring & ball softening point, °C (ASTM E 28)	80-90	100-110	110-120	125-140
Penetration hardness, dmm (ASTM D 5)	30	14	8	7
Tg (DSC), °C (ASTM D 3418)	-5	-2	3	7
Tensile strength, Mpa (ASTM D 412)	-	0.27	0.38	0.61
Elongation, %	1660	1600	1400	1200
Hydroxyl number	28	28	28	28
a Based on preliminary testing				
b Brookfield Thermosel Viscosity RVDV1+, 10 g of each sample conditioned at 90°C for 16 h in a vacuum oven prior to testing				

Table 2

Adhesive Performance of Branched Polyesters:*

Treated Substrate	Polyethylene	PET
AQ1045	50 g/mm	35 g/mm
AQ1350	87 g/mm	114 g/mm
AQ1950	97 g/mm	109 g/mm
AQ14000	68 g/mm	37 g/mm
* Heat sealed T-peel assemblies, ASTM D1876		

Technical Aspects of Polyesters

Eastman conventional water-dispersible polyesters are linear, amorphous materials comprised of aromatic acids and aliphatic glycols. Available in both pellet and dispersion form, they range in glass transition temperature (Tg) from 29° to 55°C.

Their water-dispersibility is due to the presence of pendent sodiosulfo groups randomly distributed along the polymer backbone. Incorporation of the ionic moieties is readily accomplished by copolymerization of 5-sodiosulfoisophthalate units into the polymer backbone. A = an aromatic dicarboxylic acid moiety G = an aliphatic or cycloaliphatic glycol residue OH = hydroxy end groups.

Figure 1

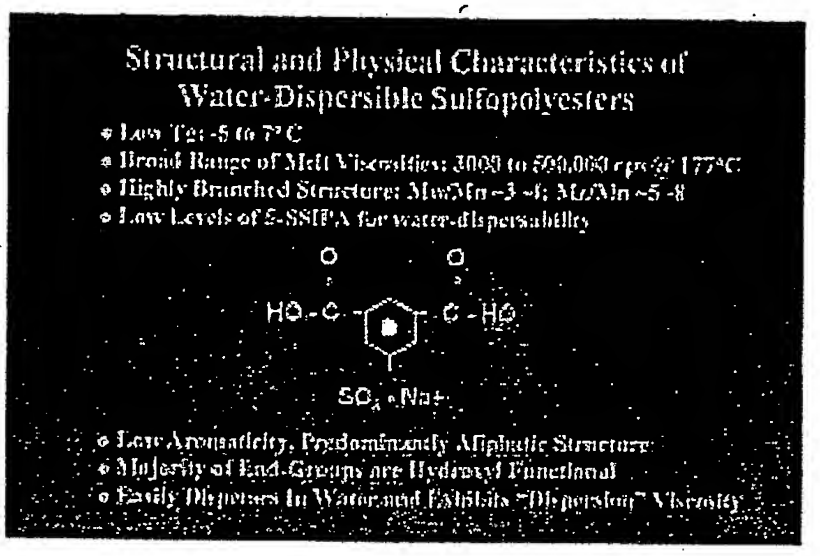
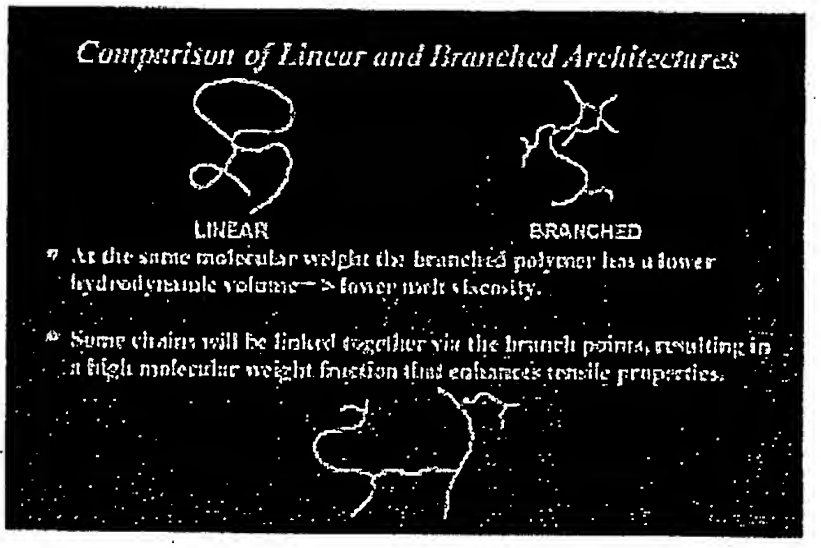


Figure 2



The following discussion covers the key differences in structure and properties between the branched polyester and conventional water-dispersible polyesters.

The unique properties of the new polyester are derived from a branched architecture and a specific combination of monomers resulting in a low Tg and enhanced compatibility with other resins. The low Tg provides, in part, the means by which water-dispersibility is readily obtained at or below room temperature, while the conventional water-dispersible polyesters are much more difficult to disperse.

The branched structure of the polyester results in low melt viscosity profiles that are required for hot-melt adhesive formulations. Potentially available in IV ranging from 0.2 to 0.65, the branched polyester exhibits melt viscosities ranging from 3000 cP to 400,000 cP at 177¢ C; a 0.3 IV branched polyester typically exhibits a viscosity of approximately 35,000 cP at 177¢ C. By comparison, the conventional water-dispersible polyester with a nominal IV of 0.3 will exhibit a melt viscosity of about 300,000 cP at 280¢ C, or over 1 million cP at 177¢ C. Since both types of material have the same IV, one might expect them to have the same molecular weight. However, their true molecular weights differ since branching most likely lowers the radius of gyration and thus decreases the hydrodynamic volume. Another aspect of molecular weight relates to distribution of chain lengths. It is likely that the low viscosity/good adhesive profile of the branched polyester results from a broader molecular weight distribution. On the one hand, there are large quantities of low molecular weight species to provide the

lower melt viscosities, but there are also more of the very high molecular weight species that are most likely yielding the good adhesion and satisfactory tensile properties. This is quantitatively illustrated by the molecular weight distributions (MWD) that were obtained from GPC analysis using PET standards; a linear analog of similar composition showed a polydispersity (Mw/Mn) of 2.3, while the branched polyester samples were in the 3.5 -4 ranges. An even more striking emphasis of this point is gained when the very high molecular weight fractions, known as Mz or the z-average molecular weight, are compared to Mn. As before, GPC analysis was used to obtain the data. For the linear and branched materials, Mz/Mn values of 4.8 and 9 - 10 were obtained, respectively. It is generally known that a high Mz/Mn is indicative of a branched material. A summary of the molecular weight distribution data is found in Table 2.

Table 3

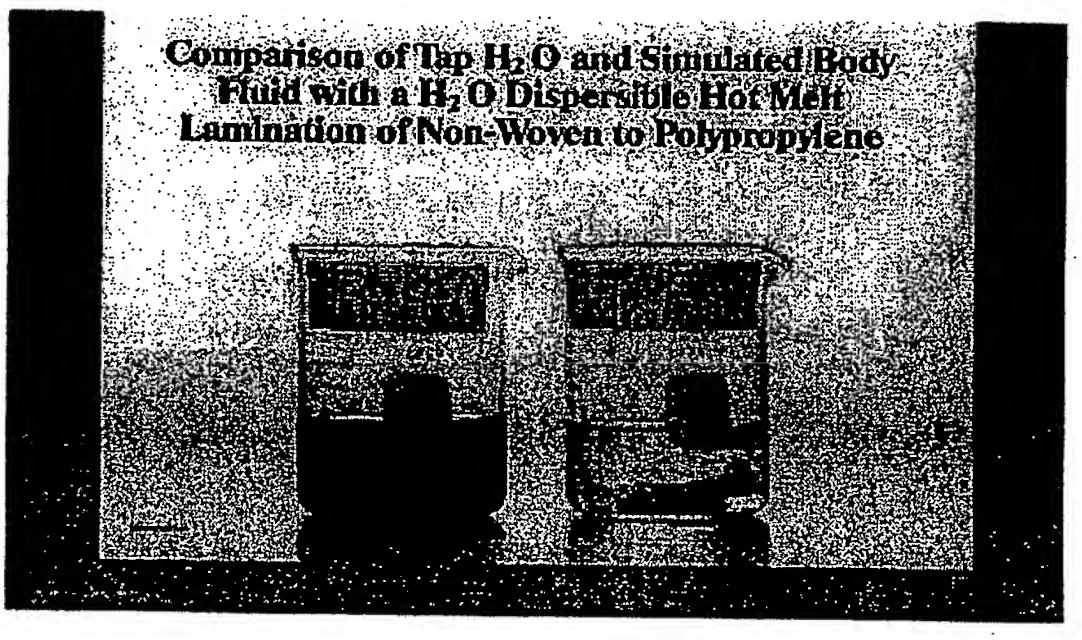
Comparison of molecular weight distribution data

Architecture	Mw/Mn	Mz/Mn
Linear	2.3	4.8
Branched	* 3.5 – 4	9 – 10

* Data is a range taken from several sample runs

Product function: These products are inherently water-dispersible due to the random incorporation of 5-sodiosulfoisophthalate units within the polyester backbone. The compatibility with a range of commonly employed hydrophobic raw materials, such as acid functional and /or aromatic or cyclic structure tackifying resins, glycol-containing oils, or cyclo aliphatic plasticizer, allows for a variety of hot-melt adhesives to be formulated. These finished adhesives are then rendered water-dispersible by the efficacy of the branched polyester as a surfactant. The recyclability or flushability of

Figure 3



non-woven adhesively bonded articles are enhanced; for example, a disposable diaper in a waste treatment environment process is not affected by the presence of insoluble masses of adhesive. The uniqueness of this branched polyester stems from its tailored molecular architecture. A proprietary process has allowed a highly branched structure to be manufactured within narrow ranges of melt viscosities. This results in a broad molecular weight distribution where there are enough low molecular weight fractions to provide the low melt viscosities, while at the other end of the spectrum there are sufficient numbers of high molecular weight species to give the tensile and adhesive properties that are needed. Another key breakthrough was the discover of a monomer composition that did not just lower the glass transition (Tg) to alleviate the brittleness problem, but also provided a high ring and ball softening point. Finally, the same ionic nature of this branched polyester that results in water-dispersibility also prevents solubility in ion-containing body fluids.

Principal applications

This product is being targeted toward large volume applications, where we have found indications of broad utility.

Non-woven product assemblies

- A variety of disposable products, such as diapers, sanitary napkins, and incontinent briefs would be more environmentally friendly if a water-dispersible hot-melt adhesive could be used. For example, a branched polyester (0.31V) quickly dissolves into a compost pile; this would facilitate the breakup of a diaper assembly and hasten the degradation by virtue of the more rapid increase in surface area. Another example could be the design of a "flushable" sanitary napkin. Once again, the assembly would undergo fragmentation more rapidly, which, in turn, would hasten degradation. It would be an understatement to say that the non-dispersibility of branched polyesters in body fluids (urine, sweat) is an essential innovation characteristic to spur these types of product developments.

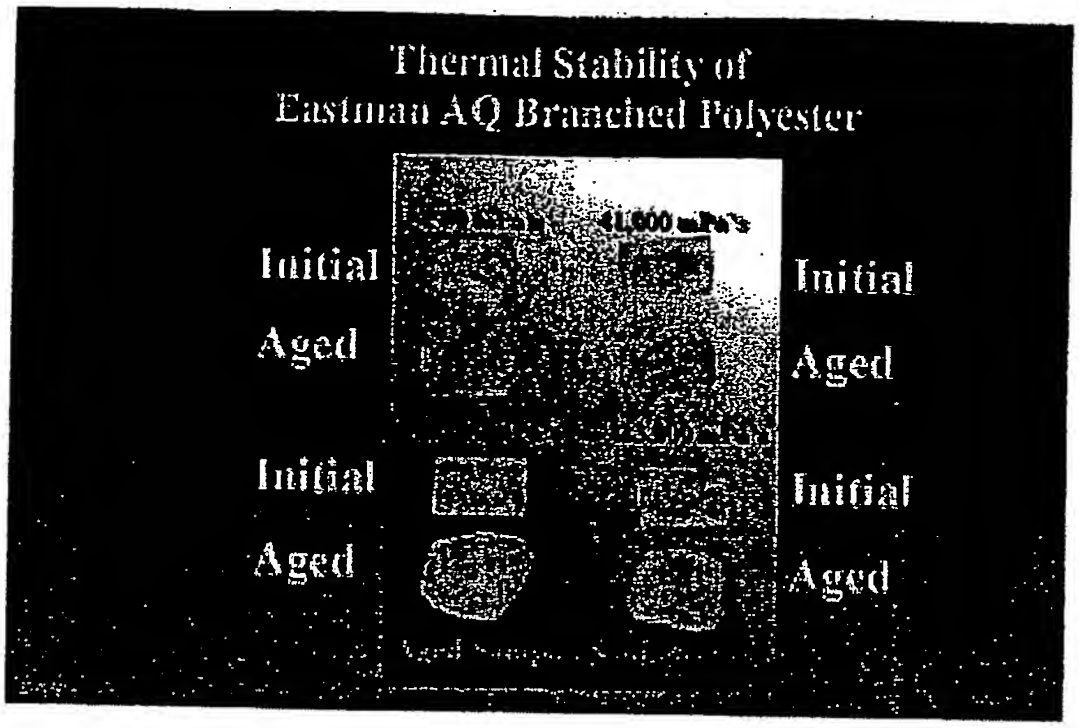
Explanation for dispersibility on sulfopolyesters in tap water and non-dispersibility in body fluid. The sudiosulfo groups introduce charged functionalities that electrostatically stabilize the polymer molecule in pure water. The remainder of the sulfopolyester, although relatively polar, is not inherently water-soluble. Because the ionic groups are randomly distributed along the backbone, it is unlikely that a classical micelle structure is formed where all the charged groups reside on the surface of a particle with the hydrophobic segments occupying the inferior. Sulfopolyesters are not known to form true solutions, but rather exist as dispersions of particles in water. Therefore, it is reasonable to expect that the surface of the particles would contain a greater proportion of the ionic groups to provide water dispersibility. The discrete particle phase is a key to the non-dispersibility in saline solutions, because adding salt to the water in essence causes the water to become a poorer solvent for the sulfopolyester. Adding ionic species to the water will invoke a situation of electrostatic repulsion where the polymer particles will have no driving force to form dispersion. Viewing this situation from the opposite perspective where the polymer would be already dispersed and salt then added to the aqueous medium, it would be possible to precipitate out the polymer. Thus, ionic strength may be used as tunable solubility mechanism for recovery of the dispersed polymer. Increasing the ionic strength of the aqueous medium to a high enough level will cause the polymer particles to overcome their repulsion, coagulate, and form a separate phase.

Incorporation into Adhesive Formulations

This unique branched polyester can be combined with a wide range of other commonly used adhesive raw materials. The tackifying resins useful in adhesive compositions are generally polar in nature and have a Ring and Ball Softening Point greater than 80¢ C. Water-dispersibility and compatibility with a variety of tackifying resins/rosins were evaluated. Results indicate excellent compatibility with resins/rosins with aromatic, cycloalphatic, or highly acid functional chemical structures. Various plasticizing or extending oils may be incorporated into the base polyester. Compatible plasticizer includes white mineral oils and benzoate plasticizer, such as dipropylene glycol dibenzoateand 1,4-Cyclohexane dimethanol dibenzoate.

Among the applicable stabilizers or antioxidants that may be used are high molecular weight hindered phenols and multifunctional phenols such as sulfur and those containing phosphorous. The water-dispersible branched polyester is manufactured with both primary and secondary antioxidants.

Figure 4



Thermal Stability of Eastman Branched Polyester

The following tables demonstrate the formulation versatilely with these sulfopolyesters, in a variety of end use applications.

Table 6

Nonwoven Adhesive

AQ1350	60%
Plasticizer	5%
Rosin Ester	35%
Viscosity @ 275F	19,350cp
Viscosity @ 285F	12,700cp
Viscosity @ 300F	8012cp
RBSP°C	87
PE to PE Adhesion	42g/mm

Table 7

Pressure Sensitive Adhesive

AQ14000	60%
Rosin Ester	20%
Plasticizer	20%
Viscosity	4000 cps
RBSP	78° C
90° Quick Tack	140 g/mm
180° Peel Adhesion	80 g/mm
RT Hold Power	22 hrs

Results and Conclusions:

The results of this study indicated that the water dispersible polyesters should find considerable utility in a wide variety of recyclable aqueous and hot melt adhesive applications. Preliminary formulations have been identified for nonwoven assemblies, and pressure sensitive applications. In each of these areas, the water dispersible polyesters provide for a unique combination of performance including water dispersibility in neutral or alkaline conditions yet not dispersible in ionic solutions such as body fluids.

References

Optimization of Hot Melt Adhesives Using Water Dispersible Polyesters, Richard A Miller and Gregg. Althen, Proceedings of the TAPPI Hot Melt Adhesive Seminar 1996.

Eastman AQ Branched Polyester a New Water-Dispersible Adhesive Raw Material, Richard A Miller and Dr.Scott George, the Journal of the Adhesive and Sealant Council, Inc., Vol.XXVI, No.1, 1195.

Miller et al. US 5,543,488 Water Dispersible Adhesive Composition and Process